
BEST MANAGEMENT PRACTICES FOR CONTAINING CRITICAL MATERIALS DURING ABOVE GROUND STORAGE AND HANDLING

Kootenai County



Produced by

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This document represents the consensus of the Secondary Containment Technical Advisory Committee and resulted from meetings held from February 2001 through March 2002. The goal of the committee was to present consistent guidelines, commensurate with the risk, for best management practices (BMP) pertaining to the containment of materials that have the potential to contaminate ground water.

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Glossary

Aggregate	Total amount of hazardous constituents from every container on site.
AST	Above Ground Storage Tank - One tank, or a combination of tanks, including connected piping, that is used to contain critical materials, and whose volume is greater than 90% above ground.
Base Flood Elevation	The elevation of a 100-year flood.
BMP	Best Management Practice - A practice or combination of practices determined to be the most effective and practical means of preventing or reducing contamination to soil or ground water.
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CMR	Critical Materials Regulation
Critical Material	Any liquid or semi-liquid, or flowable, or water-soluble solid that is listed on the most current Superfund Amendments and Reauthorization Act, Title III "List of Lists" published by the Office of Toxic Substances, U.S. Environmental Protection Agency, or is required by the Occupational Safety and Health Administration to have a material safety data sheet.
DEQ	State of Idaho, Department of Environmental Quality
Freeboard	Vertical distance between the top of the containment wall, and the surface of the material contained therein.
IDAPA	A numbering designation for all administrative rules in Idaho promulgated in accordance with the Idaho Administrative Procedures Act.
Medium	Refers to a mixture, wherein the medium is generally the larger, non-hazardous, and non-reactive portion of the mixture.
MSDS	Materials Safety Data Sheet
NDWW	Non-domestic Waste Water
OPA	Oil Pollution Act
OSHA	Occupational Safety and Health Administration
OWS	Oil/Water Separator

PHD	Panhandle Health District
SARA	Superfund Amendments Reauthorization Act
Sheen	A petroleum product layer, on water, less than 0.1 inches in depth. Visually identified by a bright, reflective layer on water, ranging in color from silver to a rainbow hue.
Site	A parcel, or contiguous parcels, of land on which a single business or operation takes place, or an individual business or operational entity among multiple businesses within a single parcel of land.
Solvent	A substance in which a chemical is dissolved. Usually the substance present in larger quantity and/or the substance that does not change state when mixed.

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Best Management Practices for Containing Critical Materials during Above Ground Storage and Handling

Kootenai County, Idaho

Introduction

This guidance of best management practices (BMPs) was developed to assist facilities and persons who store and use materials that have the potential to contaminate soil and ground water with selecting, designing, installing, and maintaining secondary containment systems. In addition, several local and state agencies have regulations requiring the use of BMPs or secondary containment in order to protect soil and ground water, including the Rathdrum-Prairie Aquifer. Therefore, the BMPs in this guidance should be used in conjunction and consultation with local and state authorities to ensure compliance with applicable regulations and local requirements.

This document was compiled through the combined efforts of industry, the State of Idaho Department of Environmental Quality (DEQ), the Panhandle Health District (PHD), the Kootenai County Planning and Zoning Department, and the Kootenai County Building Department. The Secondary Containment Technical Advisory Committee formed from these entities worked as a unified group to form consistent guidance for BMPs as they apply to the storage of critical materials in the county.

The secondary containment BMPs presented in this guidance include a general description of the containment system, suitable applications, advantages and disadvantages, design and construction guidelines, and recommended maintenance practices. These BMPs are by necessity general. Certain conditions may require site-specific modifications or an alternative practice, subject to approval by the local permitting authority.

This guidance may be updated periodically as new and redesigned secondary containment systems are developed. Contact your local building department, PHD, or DEQ to determine the most appropriate containment options for the type and quantity of materials you are storing (see Jurisdictional Guidance in Appendix A).

Objective

It is the intent of this document to present options for the proper storage and handling of critical materials. To fulfill the requirements of state and local laws, and to protect ground water from possible contamination, you must use the BMPs described here or a similar, approved practice.

This document:

- Briefly describes the regulatory authorities of state and local agencies with regard to requiring secondary containment for various chemicals.
- Establishes the types and quantities of materials subject to secondary containment.
- Discusses the criteria for selecting an appropriate site for new containment areas, including criteria required by regulation.
- Provides recommendations for properly operating and maintaining containment areas for new and existing facilities.
- Provides secondary containment construction alternatives compatible with the chemical properties of the product, as well as its storage and use.

Authorities

The **Idaho Ground Water Quality Rule** [IDAPA 16.01.11.301.01.A] states, in part: *“...activities with the potential to degrade sensitive or general resource aquifers shall be managed in a manner which maintains or improves existing ground water quality through the use of best management practices.”*

The **PHD’s Critical Materials Regulation (CMR)** [IDAPA 41.01.400.02.K] requires that certain types and quantities of critical materials be secondarily contained in order to protect the Rathdrum-Prairie Aquifer from contamination.

County codes and ordinances state that the storage of critical materials must be in conformance with the county’s Comprehensive Plan, and their Zoning and Building ordinances. The comprehensive plan has provisions for protecting ground water quality. Additionally, through conditional use permits, the county can impose more restrictive measures for safeguarding against releases.

Idaho’s Petroleum Storage Tank Fund requires additional valving and periodic leak detection monitoring before it will insure petroleum storage sites that do not have secondary containment.

State and local fire codes require secondary containment for certain types and quantities of hazardous materials.

All new, expanded, or upgraded facilities that store materials affected by this guidance must obtain approval for their containment method from the appropriate regulatory agency(ies). (See Appendix A, Jurisdictional Guidance.)

To verify compliance with environmental laws, environmental agencies (local, regional, state, or federal) may periodically inspect containment facilities storing critical materials.

NOTE: *Failure to implement an approved BMP may result in an enforcement action by one or more of these agencies.*

Chemicals Subject to Secondary Containment

The quantities of material requiring secondary containment by any or all of the agencies are generally the same as those stipulated in PHD's CMR. Chemical quantities that require secondary containment range from as low as 10 pounds (approximately 1 gallon) for extremely hazardous substances to 5,000 pounds (approximately 600 – 800 gallons) for less hazardous substances.

The relative hazard levels of chemicals have been identified by existing federal regulations. Title III of the Superfund Amendments Reauthorization Act (SARA III) and Title III, Section 112R of the Clean Air Act Amendments of 1990, gave rise to a consolidated list of chemicals called the Title III List of Lists.

Title III List of Lists

The CMR and this guidance use three categories of chemicals from the Title III List of Lists to designate the relative hazard and determine containment needs. All chemicals are placed in one of these three categories based on their relative hazard.

Each category has been assigned a unique threshold quantity, measured in pounds of chemical on site. Chemicals present on site in volumes equal to or greater than their category's threshold quantity, dictate that the establishment must implement BMPs for storing and handling that chemical.

To determine a given chemical's category, locate it on the Title III List of Lists, which is available at www.epa.gov/ceppo.

Chemicals that belong in the first two categories are determined by looking at columns to the right of the chemicals. These columns have numerical entries. The left-most column with a numerical entry designates the category (shown at the top of the column) the chemical is in. Chemicals that belong in the third category are not in the List of Lists columns, but rather are identified as those chemicals required by OSHA to have an MSDS sheet developed.

Categories and Threshold Volumes

Extremely Hazardous Substances (EHS)

A substance is required to have secondary containment if the facility has or stores:

- 10 pounds (approximately 1 gallon) in the aggregate, exclusive of medium or solvent, or
- 100 pounds (approximately 12 gallons) in the aggregate, inclusive of medium or solvent.

Examples of EHS include:

Chemical Name	CAS Registry Number
Arsenic Compounds	
Chloroform	67-66-3
Cresol	1319-77-3
Dinoseb	88-85-7
Formaldehyde	50-00-0
Hydrazine	302-01-2
Hydrogen Cyanide	74-90-8
Lindane	58-89-9
Parathion	56-38-2
Phenol Compounds	108-95-2
Strychnine	57-24-9

CERCLA Hazardous and SARA Section 313 Toxic Chemicals

These substances will list a reportable quantity and/or an indication that SARA Section 313 reporting is required. Secondary containment is required for these chemicals in the following quantities:

- 100 pounds (approximately 12 gallons) in the aggregate, exclusive of medium or solvent, or
- 1,000 pounds (approximately 120 gallons) in the aggregate, inclusive of medium or solvent.

Examples of CERCLA Hazardous and SARA Section 313 toxic chemicals include:

Chemical Name	CAS Registry Number
Acetone	67-64-1
Acids	
Antifreeze	
Benzene	71-43-2
Carbon Tetrachloride	56-23-5
Cyanides	57-12-5
Ethyl Benzene	100-41-4
Ethyl Chloride	75-00-3
Methyl Ethyl Ketone	78-93-3
Napthalene	91-20-3
Pentachlorophenol	87-86-5
Solvents	
Toluene	108-88-3
1,1,1 Trichloroethane	71-55-6
Urethane	51-79-6
Zylene	1330-20-7

SARA Section 311 and 312 Chemicals

Rather than being listed, SARA Section 311 and 312 chemicals are identified by broad criteria. Virtually any material that requires a material safety data sheet under the OSHA Hazard Communication Standard is required to have secondary containment if stored in sufficient quantities.

For these chemicals, secondary containment is required for chemicals in quantities of 5,000 pounds (approximately 600 - 800 gallons) in the aggregate, inclusive of medium or solvent.

Examples of SARA Section 311 and 312 chemicals include (but are not limited to):

Chemical Name
Diesel
Magnesium Chloride
Oil
Paint

Selecting a Secondary Containment Site

Selecting an appropriate site for secondary containment can be important to the ease of operation and maintenance, as well as more protective of the environment. The following are examples of various agency requirements:

- **Wells** - DEQ requires new construction to be a minimum of 100 feet away from drinking water wells.
- **Surface Water and Flood Plains** - DEQ requires that hazardous and deleterious materials be stored so they will not enter state waters. Kootenai County ordinances require that above ground storage tanks not be located below base flood elevations.
- **Buildings and Combustible Materials** - The Fire Protection Association requires a minimum distance of 40 feet between hazardous materials and any buildings or other combustible materials.
- **Property Lines** - County codes require at least a 50-foot setback from the property line for large quantities of petroleum. Additionally local, state, and federal codes often have setback requirements.

Constructing a Secondary Containment System

General

Laminated, coated, or clad primary containment walls are considered single-walled containment and shall not be construed to fulfill the requirements of secondary containment. All secondary containment systems must be designed and built using

generally accepted engineering and construction practices. Elevating metal primary containment containers above the floor of the secondary containment will reduce corrosion at the bottom of the containment unit. Depending on the BMP selected, an agency engineering plan and specification review may be required.

Construction Materials

Secondary containment materials must be compatible with the material being stored. Containers shall be constructed of materials of sufficient thickness and composition so as not to be structurally weakened as a result of contact with accumulated storm water or discharged hazardous materials, or from the movement of materials or machinery within the containment area.

Capacity

Secondary containment must be sized to contain 110% of the volume of the largest container or 10% of the total volume of all containers (whichever is greater). Increasing the size of the containment is recommended as an additional safety precaution. This is a particularly good idea in Kootenai County's climate where storm water or snowmelt can freeze and reduce the holding capacity of the containment.

Options

Materials

Recognized secondary containment options for storing critical materials include:

- Concrete or epoxy-lined concrete.
- Metal or metal/polymer (fabricated).
- Fiberglass.
- Bermed with a synthetic liner.
- Double-walled tanks.
- Commercially manufactured prefabricated materials.

Piping

Secondary containment options for piping include:

- Double-walled piping.
- Single-walled piping within a concrete, metal, or imperviously lined trough.

On/Off Loading Areas

Secondary containment options for on/off loading areas include:

- An impervious pad draining to an oil/water separator (OWS) and then to a grassy swale or other approved storm water management system.
- An impervious pad draining to the main above ground storage tank (AST) containment area.
- An impervious pad draining to a sealed sump or trench.

Inside Storage

Secondary containment options for inside storage include:

- A concrete floor sloped to a sump.
- A concrete floor with curb or berm perimeter.
- Prefabricated, portable secondary containment units.

Operating and Maintaining a Secondary Containment System

Properly operating and maintaining a secondary containment system is critical. To ensure the system continues to function as designed, it is important to regularly inspect and test the containment structure, manage the accumulation of storm water and leaking product, and develop contingency plans for releases.

Loading/Unloading

Storage and transport containers should include built-in overfill devices to stop the flow of product when the container is full. These containers should also be watched closely by site personnel when in use.

Inspections

Conduct daily inspections of the containment area to include checking:

- the secondary containment system for structural integrity,
- for the presence of leaks or storm water,
- for the presence of debris,
- the condition of valves and piping, and
- the condition of primary containment.

When access to secondary containment is not physically possible (e.g., double-walled tanks), inspect the interstitial monitoring system to ensure that the system is functioning properly. It is recommended that facilities document the inspection using a checklist, which should then be on file for at least one year. An example checklist is provided to assist in conducting a thorough inspection. (See Appendix D, Daily Facility Inspection Checklist.)

Leaking Product and Accumulated Storm Water

Leaking product that has accumulated in secondary containment should be removed and properly disposed of as soon as possible, or in any case, within 24 hours of discovery. Accumulated storm water should be removed any time the amount accumulated compromises the capacity requirement discussed on page 6. In the event that the storm water and product have mixed together, the mixture should be removed and properly disposed of within 24 hours of discovery. Contact either DEQ or PHD for current available disposal options.

Primary and Secondary Containment Integrity

Test the integrity of the primary containment system prior to filling the container, following nationally recognized testing standards. For primary tanks, refer to *Steel Tank Institute Guidance SP001-00* or *American Petroleum Institute Guidance 653*. For piping, refer to *American Petroleum Institute Guidance 570*.

Visually inspect the primary and secondary containment during the daily inspections mentioned above. If the secondary containment cannot be visually inspected, an annual test of the integrity of the containment should be performed. Hydrostatic or pneumatic tests are both acceptable. Hydrostatic testing entails filling the secondary containment with water and monitoring the fluid level for 24 hours or longer. Pneumatic testing tests the welds of the synthetic liner.

Contingency Plans

It is recommended that a contingency plan be developed for the site. This plan should include step-by-step instructions in the event of a spill or any other type of emergency. It is also recommended that response/cleanup materials be kept on site. A "Spill Prevention Control and Countermeasures Plan" (part of the federal Oil Pollution Act [OPA]) would cover the above recommendations, and may be required if there is a possibility of petroleum overland flow to "waters of the United States" as defined in the OPA statutes.

Training

Training should be provided to all operation and maintenance personnel. The training should include:

- loading operations and how to shut off pumps and valves,
- location of emergency response and cleanup supplies, and
- contact numbers for outside assistance (medical and cleanup response).

Construction/Management Alternatives for Storm Water Control

If storm water can enter into secondary containment, the facility must provide a means for removing and properly disposing of the storm water. Facilities should submit documentation to the appropriate jurisdictional agency regarding storm water testing strategies that will determine proper disposal. Storm water can be tested for contamination by visual observation for products that can be readily identified, float on, and don't mix with water. For products that mix with or are otherwise not visually identifiable in water, a sample or samples should be collected for laboratory analyses. For petroleum products, using an approved disposal treatment method from the list below is allowable for storm water with "a sheen" of petroleum. If any free product is present (greater than 0.1 inches in depth), it must be recovered prior to disposing the storm water.

Storm water contaminated with chemicals other than petroleum cannot use the storm water disposal options listed below. The material must be collected and disposed of properly. Facilities are encouraged to discuss disposal options with local county and state agencies.

Water generated from washing equipment inside the secondary containment area or any other type of non-domestic wastewater cannot go to a storm water outlet. This water must be disposed of as outlined in PHD's CMR (No. 1 and No. 7); DEQ's *Guidance for Fixed Location and Mobile Car, Truck, and Trailer Commercial Washing Operations and Charity Car Wash Events*; and DEQ's statute for plan review of wastewater treatment systems (Idaho Code § 39-118).

Storm Water Disposal Options

- Drainage through a pretreatment unit to a final treatment and disposal mechanism (e.g., OWS to vegetated infiltration area).
- Drainage through a treatment unit to a holding pond:
 - Ensure that the holding pond has an impervious bottom (hydraulic conductivity less than or equal to 10^{-7} cm/sec).
 - Use an OWS or a filter device at the discharge point of the containment area.
 - Allow the storm water to evaporate.
 - Continue treatment from pond to grass infiltration area, if warranted.
- If determined from testing that the storm water is uncontaminated, direct the discharge to existing storm water drainage - subject to approval by the local jurisdiction.
- Drainage through a control membrane that would seal if a small quantity of the critical material from the primary containment is detected. Drainage should still go through a pretreatment unit and final treatment/disposal mechanism.
- Pretreatment and discharge to a Publicly Owned Treatment Works (wastewater treatment facility), via existing sewer mains or transport by tanker - subject to approval by the treatment facility.

If the storm water is contaminated with a sheen of petroleum, the discharge rate through the treatment units listed above should be controlled so that the storm water does not overwhelm the unit's ability to treat the water.

Final storm water disposal options are discussed in Idaho's *Catalog of Storm Water Best Management Practices*, which is available at the local DEQ office or on the Internet at www2.state.id.us/deq/water/water1.htm. (Once the site launches, select Ground Water, then Guidance.)

Several of these options may be acceptable as disposal alternatives in Kootenai County. However, there are specific storm water disposal requirements in effect over the Rathdrum-Prairie Aquifer; therefore, discuss planned disposal alternatives with the PHD.

Storm Water Reduction/Elimination Options

Reducing or eliminating the introduction of storm water into the secondary containment area is a more reasonable long-term solution. Options include:

- Constructing a roof over the containment that allows uncontaminated storm water to drain to natural outlets. This might reduce the evaporation of product in the primary containment, as well as reduce the corrosion rate of metal primary containers. A steel roof is recommended, to reduce fire hazard. Check with local fire and building departments to ensure compliance with fire and building codes.
- Locating the storage area inside a building.

Non-Domestic Waste Water (NDWW)

Non-domestic waste water is any waste water at a site that is not produced as sanitary waste water from restroom facilities, showers, or kitchens. NDWW cannot be disposed to any subsurface location without specific approval of the PHD or other authoritative agency. Subsurface disposal of NDWW can contaminate soils and ground water and may become a significant cleanup liability for the owner of the site. If municipal sewer services are available, then the facility must connect and provide proper pretreatment as determined by the waste water treatment plant. If municipal services are **not** available, a recirculation or evaporative system will be required. In all cases, facilities must submit plans for review (IDAPA 39-118) and will be encouraged to reduce or recycle waste water streams.

Who to Contact

Initial contact will normally be with the local planning and zoning or building department. Additional contacts are the PHD for businesses located over the Rathdrum-Prairie Aquifer and the DEQ if it is outside the aquifer area. A map is included that shows the outline of the Rathdrum-Prairie Aquifer within Kootenai County. (See Appendix B, Rathdrum-Prairie Aquifer Map.)

BMP - Concrete Containment System

Description

An open concrete box, basin, or recess designed to contain above ground storage tanks. These containment systems are generally located outdoors for large-volume storage.

Application

This is the most common method of containing above ground storage tanks that are not double-walled.



Figure 1 Concrete Block Secondary Containment

Advantages

- Versatile design parameters.
- Very durable.

Disadvantages

- Integrity of patches over cracks is sometimes difficult to achieve due to the continuous expansion and contraction of the cracks.



Figure 2 Solid Pour Concrete Secondary Containment

Design Parameters/Construction Guidelines

This is a specialized use of a common building material that should be designed and installed by experienced engineers and contractors.

- Design the containment to allow inspection with the primary container in place.
- Consider the site's soil-bearing strength and consolidation.
- Ensure water-cement ratios and curing methods are sufficient to minimize permeability and cracking. (Attain a permeability of 10^{-7} to 10^{-10} cm/sec.)
- Ensure proper reinforcement to minimize cracking.
- Use chemical resistant water stops in all joints and penetrations.

- Use air entrainment as needed to provide resistance to freeze-thaw cycles.
- A minimum compressive strength of 4,000 psi after 28 days is recommended.
- Grade the floor to an outside drain or to an internal sump.
- Ensure drains are valved and closed.
- Establish quality control measures for the manufacture, delivery, and pour of the concrete.
- Use a canopy to exclude storm water, where possible and where allowed by fire codes.
- Because salts, acids, and alkalis can adversely affect concrete, it should be sealed for use in these applications. (See Appendix C, Concrete Coatings.)

Maintenance

- Daily inspections recommended.
- Inspect for cracks caused by impact, excessive loading, vibration, freeze-thaw, settlement, etc.
- Inspect joints and penetrations for gaps caused by shrinkage, settling, poor design, etc.
- Immediately clean up any spills and re-use or properly dispose spill waste.
- Drain or pump and haul storm water according to guidelines. (See the storm water section in this guidance.)
- Thoroughly prepare the surface prior to any repairs.

BMP - Floor Containment System

Description

An impervious floor and sidewalls, generally constructed of concrete, that provide containment for either solid or liquid critical materials. The concrete should be coated with a sealant. Due to its permeability and the difficulty of clean up, asphalt is not an acceptable floor material.

Application

Situations where indoor work areas, piping, drums, tanks, bags, or blocks of critical material need secondary containment, and where containment is provided by the floor, curbing, and sidewalls. The entire floor area, or a portion of the floor, may be used for containment. A variation is to construct a recessed area in the floor, with containers either placed in the recessed area, or over the recessed area on grating. This application is not appropriate for highly flammable, toxic, or volatile materials that are dangerous if spread over the floor.



Figure 3 Concrete Floor Sloped to Center



Figure 4 Example of a containment sump pump built below floor level.

Advantages

- Little or no additional cost for new construction sites.
- Flooring serves as containment and a functional work area.

Disadvantages.

- Retrofit may be difficult or expensive.

Design Parameters/Construction Guidelines

- Construct floors and sidewalls of concrete or similar material (not asphalt).

- Concrete should be coated with an impervious material that will be compatible with the critical materials. (See Appendix C, Concrete Coatings.)
- Curbing may be used to create a small containment area in a portion of the building.
- Ensure the thickness and construction of the floor is compatible with the intended use (e.g. use of heavy equipment).
- For liquid materials, grade the floors to drain to a sump or trench drain where spills can be collected and removed.
- Install water stops in concrete joints.
- Ensure the sidewalls are high enough to provide the required containment volume.
- Design entryways to prevent escape of liquid materials, taking care to not create barriers that will be a tripping hazard, or that will be difficult to negotiate with equipment. Installing ramps at doorways, into sumps, or over curbs may alleviate these problems.
- Grating may be installed over trench drains or recessed containment areas to allow passage of people or equipment, or to allow critical materials to be placed at floor level over containment areas.
- In general, drains should not be installed in floors used for secondary containment. If the situation warrants a floor drain, it must have an approved method of discharge. Floor drains cannot be connected to dry wells, septic systems, sewer systems (unless approved by the wastewater treatment plant), or otherwise discharge from the building. Holding tanks connected to floor drains must be leak proof, constructed of material that is compatible with the products it will contain, and easily accessible for removal of spills. Test the integrity of all holding tanks prior to use.

Maintenance

- Periodically inspect floors and sidewalls and seal any cracks to provide an impervious surface.
- Recoat concrete as necessary.
- Clean up spills promptly.

BMP - Membrane Liner Containment System

Description

Geomembranes (flexible membrane liners) installed as secondary containment, either in a buried configuration with a suitable cover material or exposed to the surface. Both types of installation are placed on a prepared subgrade selected to provide protection of the liner from damage and to establish grade for the containment.



Figure 5 High Density Polyethylene Liner

Applications

Liners are best suited to installations where access to the secondary containment area will not require the use of heavy equipment that could damage the liner.

This type of containment is more suited to larger installations where a significant area needs to be included within the containment and cost savings are available. Other secondary containment designs might be better suited for small containment areas or for installations requiring access onto the containment area.



Figure 6 Liner Containing Tank and Piping

Liners can be installed in single or multiple layers depending on the sensitivity of the location. Underdrains, interstitial monitors and drains, cushion geofabric liners, and surface drains can be included to enhance monitoring and performance.

The thickness of the liner (expressed as “mils” or thousandths of an inch) should not be less than 30 mils to provide adequate strength and durability. For installations that need greater protection, thicker, reinforced liners can be used. A 60-mil liner is common for many such installations. Liner manufacturers are good sources of technical assistance in the selection of a proper liner material for a particular installation.

Consider the foundation and support when installing the liner underneath a tank or other heavy objects.

A sloping bottom is needed to collect, remove, and treat storm water that accumulates above the liner. If possible, installation of a roof over the containment area is recommended. Liners should not be used in areas of shallow ground water, where the water table has the potential to rise and lift the liner. Maintenance requirements for the liner should be detailed for the owner, by the manufacturer.

Advantages

- Highly impervious to seepage and not subject to cracking because of their flexibility.
- Becoming more available as more contractors can install, test, and repair liner systems.
- Liners without cover material are easy to visually inspect for damage. If damaged, maintenance personnel can repair the liners with patch pieces.
- May be less expensive to install than other containment systems.
- Can be more resistant to deterioration than other materials.
- May be more cost-effective when removal and/or replacement are considered. A liner can be removed and replaced or overlaid with a new liner when worn or damaged, usually at a cheaper cost than conventional containment materials.

Disadvantages

- Exposed liners are vulnerable to rips and tears during installation or when operating equipment inside the containment.
- For covered or buried liners, when leaks are suspected, it may be difficult to locate where the liner has failed.
- If periodic hydrostatic testing is used to determine impermeable condition, the test may be difficult to precisely conduct and may interfere with daily operations.
- Because of the potential of damage to the liner, activities inside the containment are limited.
- Exposed geomembranes may degrade over time and require replacement.
- Exposed liners may be slippery due to spills or precipitation, and therefore dangerous for people working inside the containment system.
- Liners are relatively new technology without a history of service longevity.
- Liner installation requires special equipment and training that might not be locally available in some rural areas. Equipment to install and test the liners is expensive.

Design Parameters/Construction Guidelines

- Either reinforced or unreinforced membranes can be selected for these installations.
 - The reinforced type consists of an internal polymer thread in a matrix with a polymeric coating on both sides.
 - The unreinforced type consists of a homogenous flat sheet.

A variety of polymeric resins can be used to manufacture geomembranes.

- In some instances a geotextile cushion liner can be placed below the geomembrane and on the subgrade to provide additional protection and longevity.
- A liner requires careful preparation of the subgrade. Subsequent settling after the liner is installed may cause the liner to stretch or tear.
- When liners are designed for a covered or buried configuration, suitable cover material at least six inches in depth must be compatible with the liner strength, as well as operation and maintenance activities within the containment.
- High-density polyethylene (HDPE) or polyvinyl chloride (PVC) is typically used for the liner material although other materials with equal performance might be commercially available. The type of membrane material used depends on the resin's resistance to the contained liquid.
 - PVC liners need to be covered to avoid exposure to sunlight, which can damage the integrity of the liner.
 - HDPE liners have the advantage of being installed exposed to the surface because HDPE does not deteriorate due to ultraviolet radiation.
- Liners can be used with other containment material for berms and edges. The connection between the two materials must be capable of withstanding the conditions present within the containment area. The edges of containments using liners require a suitable structural support for the liner.
- For sensitive areas, liners can be installed with two layers and interstitial monitoring to detect failure of the primary liner and provide an additional barrier to product release.
- Underdrains should be installed to detect and collect product in the event of liner failure.
- Liners should be sloped to a location where periodic visual inspections for the presence of product can be performed.

Maintenance

- A periodic visual inspection must be performed to assure that the liner will contain spilled liquids.

- Test seams using air-testing or spark testing equipment to detect any failure.
- Remove any accumulation of storm water on top of the liner to a proper treatment and disposal site.
- If storm water fails to accumulate as expected after storm events, operators should suspect liner failure. Repairs can then be made before a spill occurs.
- If liners are buried, an annual hydrostatic test of the system should be performed.

BMP - Non-petroleum On/Off Loading Pad Containment System

Description

An impervious concrete pad, preferably with curbing along the perimeter and a sloped surface to a low point on the pad. The pad should cover the entire area under the transfer vehicle and have the capability to store a minimum of 100 gallons of product.

The system must have controls for capturing and disposing of storm water, such as either a sump or a drain that directs spilled product or storm water back to the main above ground storage tank containment area.

It may be appropriate to line, coat, or seal the pad, depending on the material being transferred.



Figure 7 Loading platform that slopes to the center.

Application

Bulk transfer of liquid and solid non-petroleum critical materials. This includes, but is not limited to, bulk fertilizers, acids, caustics, road treating, and de-icing materials.

Design Parameters/Construction Guidelines

The pad should be constructed following generally-accepted engineering design and installation practices that account for the anticipated maximum load. The ingress and egress design must ensure the pad's integrity and holding capacity is not compromised.

A canopy or covering can be added above the on/off loading area to control storm water. For covered and non-covered areas, the pad should be curbed and sloped to transmit spilled product or storm water to a collection area. This area can be the main product storage containment area or a separate sump or basin. The pad and sump should be sized to hold 100 gallons of product, as well as storm water from an average five-year storm event.

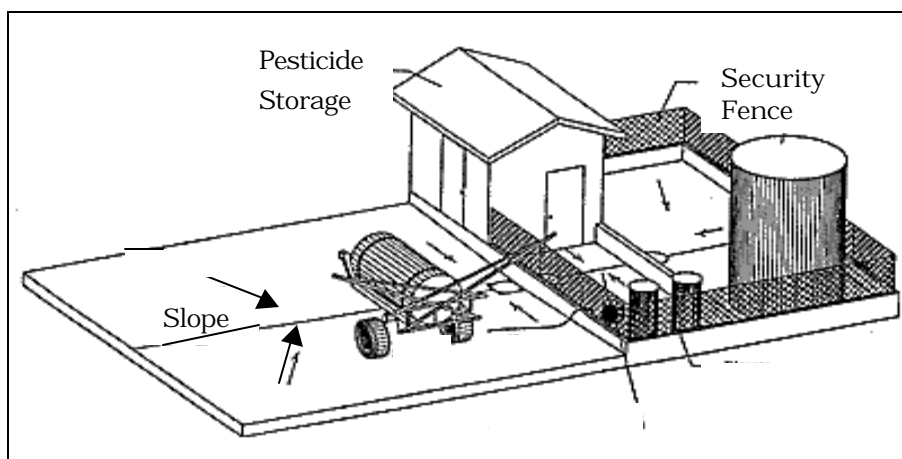


Figure 8 On/Off loading pad that drains back to the tank storage area.

Maintenance

The pad and drainage system must be inspected periodically to determine the integrity of the containment. Systems that accumulate storm water must be assessed after storm events to ensure that the 100 gallon product capacity has not been compromised. If accumulated storm water infringes on this capacity, the storm water should be pumped out and properly disposed of within 24 hours. Systems that accumulate grit and sand will eventually require pumping and proper disposal. Spill response and clean up materials should be stored on site.

BMP - Petroleum On/Off Loading; Impervious Pad Draining to Tank Containment Area

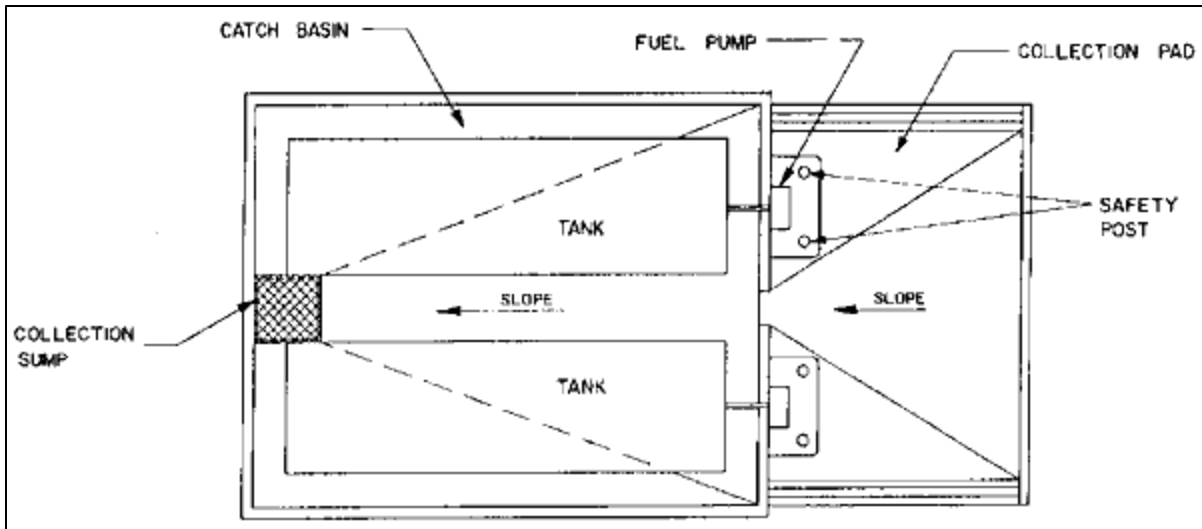


Figure 9

Description

A concrete slab that is sloped to the main above ground storage tank containment area. Slab may be curbed for additional containment ability. Spilled product and storm water drains to the tank containment for reuse or disposal. The tank area's secondary containment capacity must take into account the additional amount of fluids that could come from the on/off loading pad. This additional capacity must be a minimum of 100 gallons.

Application

This BMP is applicable for facilities that have above ground storage tanks in close proximity to the on/off loading area. This application also works well for sites that do not have the extra room to provide for a large storm water treatment area.

Advantages

- Less cost than a pad with a canopy.
- The storage for spilled product or storm water from the on/off load pad is the entire product storage, secondary containment area.
- There is only one area where product or storm water would have to be pumped out.

Disadvantages

- More wastewater to be treated than a pad with a canopy.

- A slightly larger storage area must be built to accommodate storm water from the on/off loading pad and spilled product from the transfer equipment.
- Above ground storage tanks might need to be elevated due to the additional storm water coming from the on/off loading pad.

Design Parameters/Construction Guidelines

The pad should be constructed following acceptable engineering design and installation practices that account for the anticipated maximum load. The ingress and egress design must ensure that the pad's integrity or holding capacity is not compromised.

Coating the pad is recommended; however, the coating must be durable enough to stand up under the stress of vehicle movement and on/off loading operations. (See Appendix C, Concrete Coating.)

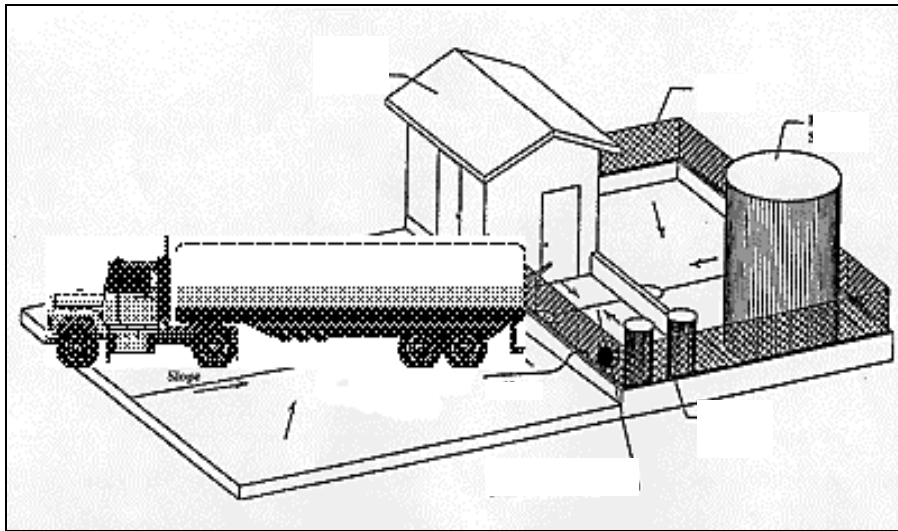


Figure 10

Maintenance

The pad and drainage system must be inspected periodically to determine the integrity of the containment. The inspection should include measuring for adequate freeboard in the containment area. Spills should be cleaned up promptly. Storm water must be removed and properly disposed of when it infringes on required containment capacity.

BMP - Petroleum On/Off Loading; Impervious Pad Draining to Sump or Trench Drain Containment System

Description

An area consisting of an impervious pad that drains to a blind sump or trench drain. All materials used must be compatible with and capable of containing minor spills (100-gallon minimum) of petroleum combined with any storm water that has collected in the sump or drain.

Application

Designed to contain small spills that occur when petroleum products are transferred between a stationary tank or tanks and a tanker truck, piece of machinery, or other vehicle. This application should be used only when a business is fueling its own equipment and its total storage tank capacity is less than 2,000 gallons. In such case the containment system should be designed and constructed in a fashion that would contain a petroleum release plus storm water accumulation.

Advantages

- Ease of product recovery.
- Lower construction cost (e.g., no OWS, canopy, or additional piping).

Disadvantages

- Handling of storm water collected in the containment area and sump may add to operation and maintenance costs.



Figure 11 Trench located in shaded area of pad.



Figure 12 On/off loading pad with blind sumps.



Figure 13 Small on/off loading pad with blind sump.

Design Parameters/Construction Guidelines

Construct a concrete slab that will be compatible in size and thickness for its intended use. The slab should have sufficient slope or curbing to contain and direct the material released to the blind sump or trench drain.

The sump or trench drain should be constructed in a fashion that allows a release to be collected and removed by trained personnel. Water stops shall be installed in all concrete joints to prevent leakage through the joints. If a trench drain is used, a metal or composite grate system may be used to cover the trench. If a sump is used, it must be constructed of a material that is compatible with the product it will contain and it must be leak proof. Multi-part sumps should only be used if the manufacturer certifies them. Otherwise a seamless sump should be installed. The integrity of all sumps should be tested prior to use.

The containment volume of the sump or trench drain shall be large enough to contain the anticipated amount of the largest release combined with a calculated amount of storm water directed to it from the impervious slab.

When calculating the largest anticipated release, take into account the diameter size and length of the transfer hose, the rate of volume (gpm), and the response time to shut off the valving. At a minimum, the sump and pad area must be able to hold 100 gallons of fluid.

Designs should follow standard engineering practices and be approved by the local building, fire, and health departments.

Operating, Maintaining, and Inspecting

This BMP should not be used if the area is subjected to water other than storm water (e.g., equipment washing), as the 100 gallon spilled product holding capacity would be continually jeopardized, and the ability to dispose of the water would likely become more expensive and complicated.

All on/off loading areas should be inspected periodically and a record of inspection maintained. If storm water is detected, it should be maintained at a level below that which would impede either the minimum calculated containment volume or a set 100-gallon capacity. Any deficiencies in this area should be corrected in an expeditious manner. Clean up spills promptly.

BMP - Petroleum On/Off Loading Vehicle Fueling Site (no canopy)

Description

A pad constructed of an impervious material (generally concrete) that is curbed or sloped to contain a minimum of 100 gallons of product. Spilled product and rain water drain from the pad to an oil-water separator (OWS). The water from the OWS discharges to a grassy swale or other approved wastewater disposal mechanism.

Application

This BMP is recommended for smaller operations (storage of less than 10,000 gallons of petroleum) where the cumulative amount of small spills from loading and unloading operations would be less likely to overload the storm water treatment system being used.

Advantages

- No collection and disposal costs for waste water accumulated within the containment system.
- Less cost than a pad with a canopy.
- The control valve at the OWS discharge can be closed, providing immediate, additional containment of product in the event of an emergency.

Disadvantages

- Upkeep and maintenance of OWS and grassy swale.
- More wastewater to be treated than a pad with a canopy.
- More expensive than just a containment pad with sumps.
- May not be able to handle all of the product from a large release.
- The OWS is less efficient with higher water flow (large precipitation event).

Design Parameters/Construction Guidelines

The pad should be constructed following acceptable engineering design and installation practices that account for the anticipated maximum load. The ingress and egress design must ensure that the pad's integrity or holding capacity is not compromised.

Coating the pad is recommended; however, the coating must be compatible with the petroleum product and durable enough to stand up under the stress of vehicle movement and on/off loading operations. (See Appendix C, Concrete Coatings.)

The OWS must be sized to handle the maximum product discharges anticipated from the pad. The minimum size of the OWS should be 1,000 gallons.

Grassy swales must be designed to allow for maximum vegetation uptake of the wastewater. [See *Catalog of Storm Water Best Management Practices for Idaho Cities and Counties* at www2.state.id.us/deq/water/water1.htm.]

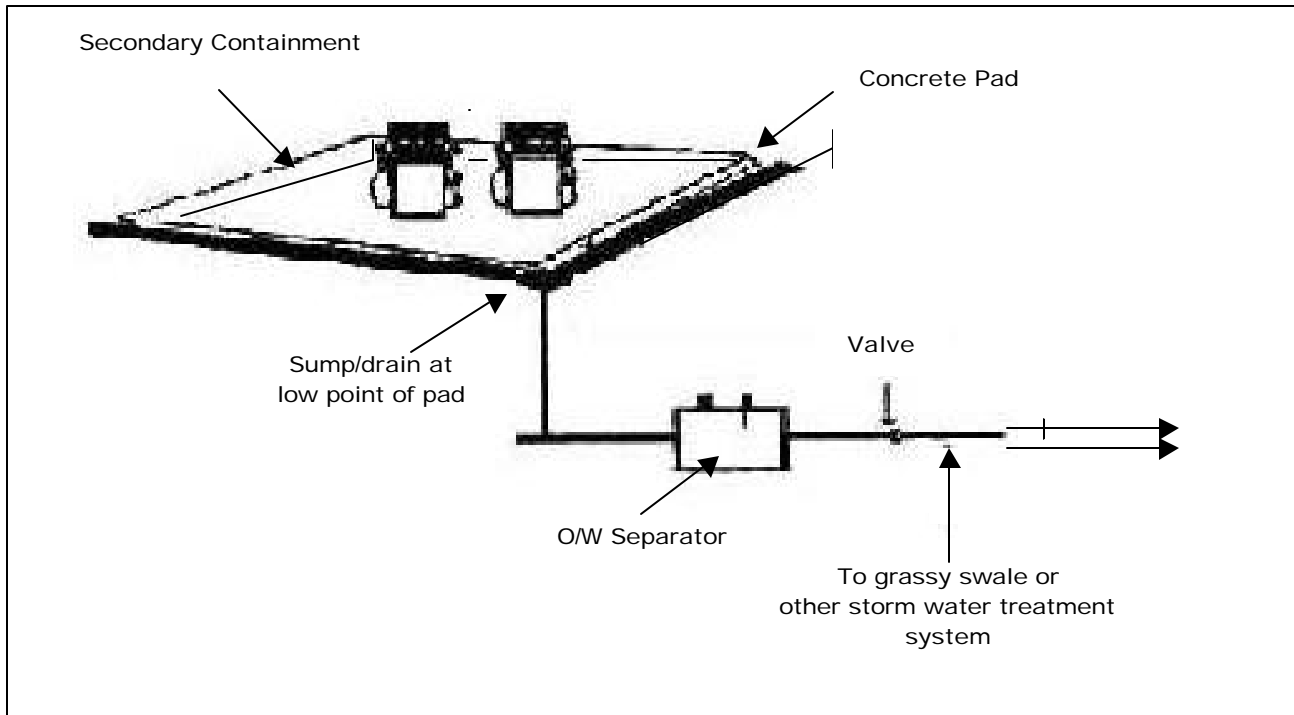


Figure 14 Schematic of waste water treatment train

Operating/Maintaining/Inspecting

The pad and drainage system must be inspected periodically to determine the integrity of the containment. Inspection should include measuring for sludge buildup in the bottom of the OWS and floating product on top of the water in the OWS. Absorbant pads or booms can be used to collect floating product. Significant sludge buildup and used absorbants must be removed and properly disposed.

BMP - Petroleum On/Off Loading Vehicle Fueling Site (with canopy)



Figure 15

Description

A canopy constructed over an impervious concrete slab that is curbed or sloped to contain a minimum of 100 gallons of product. The slab is designed to discharge to central trench drains and a catch basin. Storm water and contaminants travel via underground piping to an oil-water separator (OWS) that discharges to a grass infiltration area or other acceptable storm water treatment system.

Application

These construction standards are designed for public fueling operations; however, this design meets or exceeds performance standards applicable to all petroleum on/off loading operations.

Advantages

- The canopy reduces the accumulation of storm water that needs to be processed.
- No collection and discharge costs for wastewater collected within the containment system.
- Storm water from the canopy is directed away from the on/off loading pad.
- The system requires minimal maintenance and reduces disposal costs by comparison to holding tanks and blind sumps.
- The control valve at the OWS discharge can be closed, providing immediate, additional containment of product in the event of an emergency.

Disadvantages

- Given the construction costs of a canopy, this is the most expensive design system.
- Periodic disposal of petroleum and sludge from OWS.
- A grass infiltration system will need periodic maintenance.

Design Parameters/Construction Guidelines

- Building, electric and fire codes require that an engineer design and oversee construction.
- The fuel island (the area under the canopy) should be designed to prevent runoff of spilled fuel and run-on of storm water.
- The pad must be constructed with sufficient strength to hold the heaviest anticipated transport vehicle.
- The ingress and egress design must ensure the pad's integrity or holding capacity is not compromised.
- Other considerations include whether to seal or coat the pad, and sloping it so that it drains correctly.

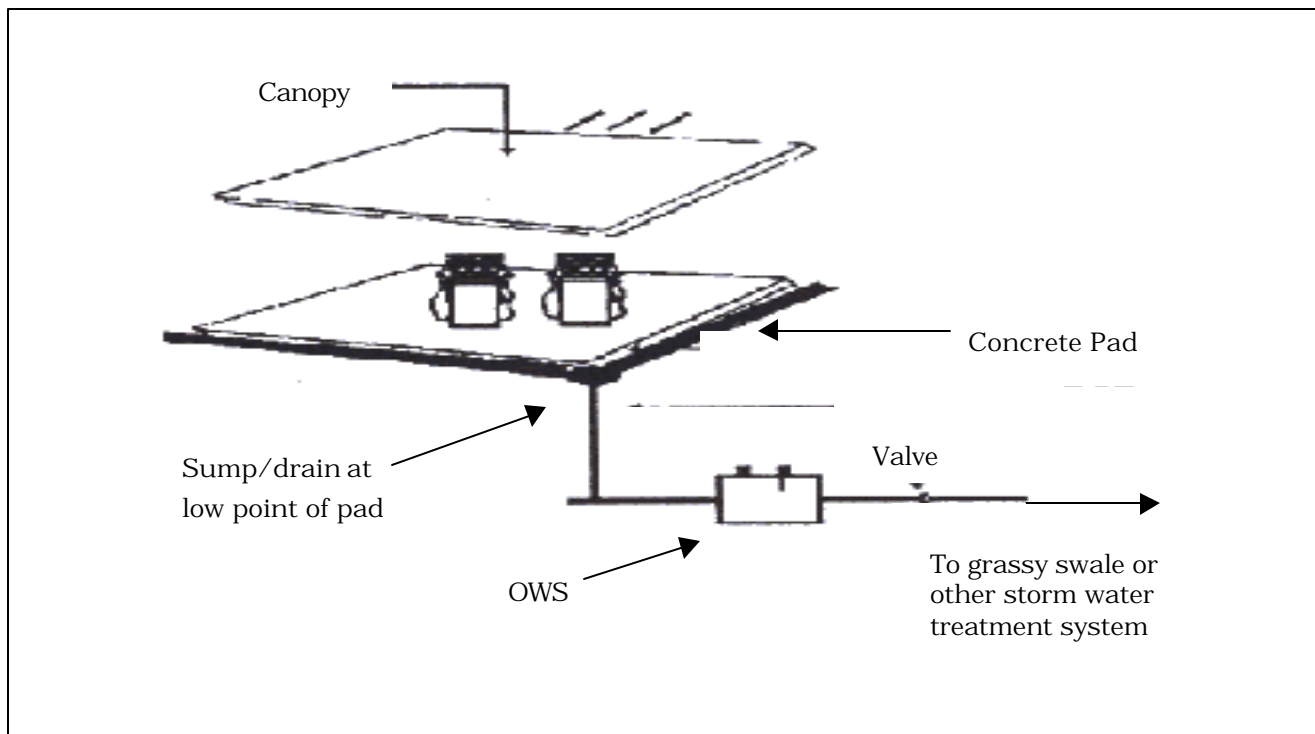


Figure 16

Covered fueling pad with drainage through OWS, to grassed infiltration system

- Grassy swales must be designed to allow for maximum vegetation uptake of the wastewater. [See *Catalog of Storm Water Best Management Practices for Idaho Cities and Counties* at www2.state.id.us/deq/water/water1.htm.)]
- The OWS must be sized to handle the maximum product discharges anticipated from the pad. The minimum size of the OWS should be 1,000 gallons.

Maintenance

- Passive skimming booms or pads, that absorb hydrocarbons, should be placed in the OWS. Periodic inspection will determine when the booms and pads require replacement.
- The OWS should be inspected periodically. Accumulating sludges and petroleum layers will need to be removed when the build up of these contaminants compromises the system's ability to operate properly. Without periodic pumping of the OWS, the swale will become overloaded with contaminants.
- Systems that accumulate grit and sand will eventually require pumping and proper disposal.
- Cleanup materials should be stored on site to allow prompt reaction should a spill occur.

BMP - Piping Containment System (double-wall)

Description

A piping system that provides for detecting, containing, and recovering product that is transmitted via pipeline. This indoor/outdoor pipeline system may be located either above- or below-ground.

Application

Sites that need to transfer product via pipeline as a part of the operations process, including loading and unloading.

Advantages

- Limits spilled product exposure to environmental factors (e.g., sunlight, temperature, and storm water).
- Insulating properties.
- Less maintenance, particularly with regard to storm water.
- 100% containment of pure product leaking from primary containment resulting in reuse of product.

Disadvantages

- Unable to perform visual leak detection on the primary containment.
- In some cases, space intensive.



Figure 17 Flex, outer wall piping.



Figure 18 Example of double wall piping.

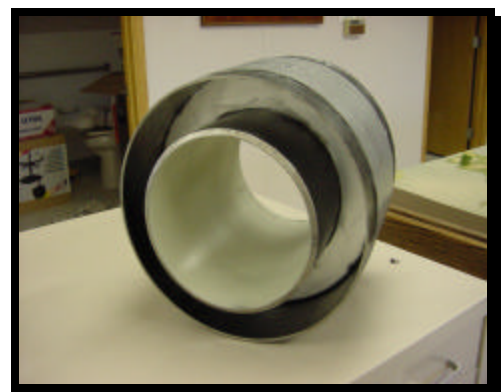


Figure 19 Large, steel, double-wall piping.

Design Parameters/Construction Guidelines

- The piping must be compatible with terrain, location, environmental factors, and product properties.
- The piping must be designed and installed appropriately for leak detection (i.e., piping sloped to sump).
- The system may include sloping to a containment sump, isolation/shut off valves (if applicable), and pressure relief valves.

Maintenance

- Periodic inspections of the pipeline and monitoring equipment.

BMP - Piping Containment System; Single-wall Piping Inside Impervious Trough

Description

A piping system with secondary containment that provides for detecting and recovering product that may leak out of the primary piping. Piping may reside inside the main secondary containment system for above ground tanks, or in an open trough made of concrete or metal, or lined with an impermeable membrane.

Application

Sites that transfer product as a part of the operations process or in the loading and unloading process.

Advantages

- Typically less expensive than double-wall piping.
- Leaking product is easier to detect and leaks are easier to fix.
- Impact of a foreign object is less likely to compromise the containment (i.e., impact by vehicle or projectile).

Disadvantages

- More maintenance, particularly with regards to managing storm water.
- In some cases, space intensive.
- Debris can collect in the trough, making recovery and reuse of spilled product more difficult.



Figure 20



Figure 21



Figure 22

Design Parameters/Construction Guidelines

- The piping must be compatible with the terrain, location, environmental factors, and product properties.
- The piping must be designed and installed appropriately for leak detection, and the ability to recover the material that leaks into the impervious secondary containment.
- The system may include sloping to a containment area and emergency isolation/shut off valves.

Maintenance

- Periodic inspections and general preventive maintenance, especially in eliminating any outside contamination in the secondary containment.

BMP - Prefabricated Containment System

Description

Prebuilt or prefabricated storage units that can be permanent or portable, and that can be placed in strategic locations within or outside a building. Prebuilt units can come in several forms. Some of the more common units are plastic or metal.

Constructed units can be portable but may also include a more permanent arrangement, such as a secondary concrete pour to form curbed containment areas on the floor.

Application

Well suited to businesses that have several types or small quantities of materials to contain. Allows for changing or fluctuating products and arrangements. Portable containment areas are beneficial for operators who are leasing, as they can generally take their containment units with them when they leave.

Examples of materials that are typically stored in this type of secondary containment include barrels of lube oil, five-gallon buckets of paint, anti-freeze, and used oil.

Advantages

- Allows for segregation of incompatible materials.
- Limits spills to smaller areas.
- No large construction or retrofit issues.
- Prevents spills from moving outside of the building.
- Storing products indoors provides added security from vandalism and protection from weather.



Figure 23



Figure 24



Figure 25



Figure 26

Disadvantages

- May limit movement of indoor equipment (e.g., forklifts).
- May be more difficult to move containers into or out of the secondary containment.
- Limited to holding smaller volumes of materials.

Design Parameters/Construction Guidelines

Whether buying or building, ensure that the containment is structurally sound, the containment material is compatible with the material being stored, and equipment accessibility to the containment area is adequate. Special attention should be given to the load-bearing strength of the floor on which the containment unit is placed.

Provisions for channeling spills inside the containment to a collection area (sump) and ventilation in the event a spill occurs, should be considered.

Maintenance

- Absorbent and diking materials should be stored near the containment area.
- Periodic inspections should be conducted to assess containment integrity, indications of leaks/spills, and the operating condition of associated equipment, such as ventilation systems.
- Assure there is adequate room in and around the containment unit to perform proper inspections.
- Keep minor spills cleaned up and do not use the unit to store unrelated material and equipment.

BMP - Steel Containment System

Description

The steel structure is generally stainless, galvanized, or epoxy-coated. Often it is combined with other construction materials (e.g., a liner or concrete for the floors, and rubber or epoxy at steel joints).

Application

A steel containment system is suitable for containing most types of critical materials in any quantity.

Advantages

- Very durable; will not crack over time.
- Less maintenance.
- Can be dismantled and moved.
- The material is usually available locally.

Disadvantages

- May be more expensive than other materials.
- Incompatible with some chemicals (e.g., acids).
- If containment is made with a steel floor, the junction between the floor and wall may be harder to seal. Also, a steel floor would make the total containment fairly expensive.



Figure 27



Figure 28



Figure 29

Design Parameters/Construction Guidelines

- The floor of the secondary containment should be continuous below the primary tanks and strong enough to hold the weight of the primary tanks.
- A sump and methods for removing accumulated product and storm water should be designed into the system floor.
- A roof or other mechanism for keeping storm water out of the containment area should be considered.
- Coating the steel may be appropriate for corrosion protection or to reduce bacteria growth, which can form mold.

Maintenance

Periodic inspection of the containment system with special attention to the wall joints.

BMP - Above Ground Storage Tank (AST) Containment System (double-wall)

Description

A tank system that provides for detection, containment, and recovery of product stored in the tank. The system may be located outdoors or indoors.

Application

On site storage of products in single or multiple double-walled tanks. Well suited for critical materials that must be isolated if they should leak out of primary containment. Above ground storage tanks also work well in areas where space is constricted, whether doing a retrofit where the size of the secondary containment needs to be reduced, or when the original secondary containment cannot accommodate an increased or upgraded primary containment unit.

Advantages

- 100% containment of leaked product, resulting in reuse .
- Vapor released to environment much less likely.
- Less maintenance, particularly with regard to storm water.
- Portability - can be moved much easier.
- In some cases, may take up less space.
- May be easier to install.
- Convenience, durability, and expedience.

Disadvantages

- Determining the exact location of a leak may be more difficult.
- Cannot perform visual inspection of primary containment.
- Piping containment may be more difficult.
- Overfills may not be contained.
- Overfill protection devices may be more difficult or expensive to install.
- Additional secondary containment required for piping.
- The primary and secondary walls of these tanks can both fail when struck by projectiles or out-of-control vehicles

Design Parameters/Construction Guidelines

- Tanks need to be properly designed for the product stored.
- The tank design must meet applicable regulations.

Maintenance

- Regular visual inspections of the outer containment wall.
- Regular manual or electronic testing of interstitial area.



Figure 30
Right hand tank is a double walled tank

BMP - Temporary Containment Systems

Description

The temporary placement and use of secondary containment vessels, liners, barriers, or encapsulating pads for retaining spilled fluids or solids.

Barriers with Liners

Concrete Jersey Barriers, Ecology Blocks, "K" rails, and Masonry Units can be used as the vertical support wall for containment. These walls can be placed in any configuration as long as they form an enclosed vertical barrier 360 degrees around the containment source. Impervious liners are laid or positioned within the boundaries of the vertical walls and secured.

Earthen Berms with Liners

An excavated or at-grade containment area with a bermed perimeter constructed of native soils or other inert materials. An impervious liner is then positioned and secured to protect all of the bermed containment area.

Containment Pads

Plastic, fiberglass, or fabric-formed containment structures that are specifically conformed to the shape and size of the application. Usually placed at fueling station nozzle points or under parked storage containers (e.g., railroad cars, tankers, and fueling stations).

Boom Liners

Constructed of different materials and configurations, these usually offer only small containment possibilities. These units are most often used for inside containment situations (mainly offloads or spill control), but can be used for exterior applications.



Figure 31 Mobile Containment Unit
(well suited for fueling areas or
on/off loading pads)



Figure 32 Temporary Containment Unit
(made of large concrete
blocks and liner)

Liners come in any configuration and shape. Most are tarpaulin form and are PVC, reinforced oil resistant PVC, polyethylene (MDPE), high density polyethylene (HDPE), rubber liners, Koroseal liners, Burke seal, urethanes, and other manufactured materials. All can be used as membranes for temporary secondary containment.

Application

Critical materials that exist on a site for more than 30 days must have secondary containment. Temporary secondary containment units shall meet all jurisdictional setbacks as required for permanent installations. The usual places of installation and use are in conjunction with new facility construction that needs temporary storage; such as, truck, vessel, or train docking and fueling stations, and road construction projects. Most jurisdictions require engineering for system installations along with manufactured listings.

Advantages

- Cost effective in time estimates, labor, and installation costs.
- Ease of removing and installing compared to permanent placement.
- Leaks are easy to detect.

- Good for short-term placement.

Disadvantages

- Not a long-term solution.
- Tend to deteriorate over time and exposure to the elements.
- May encompass large areas with greater risk of potential exposure.

Maintenance

Due to the temporary nature of these units, they are often not installed with the same care and detail as a permanent containment structure. Therefore, daily inspection of these units is critical.

Absorbents, as well as diking and cleanup materials should be on site and readily accessible.



Figure 33 Synthetic secondary liner

Appendix A - Jurisdictional Guidance

Department of Environmental Quality

The DEQ reviews all critical materials storage and handling **off** the Rathdrum-Prairie Aquifer and within Kootenai County. DEQ is responsible for ensuring compliance with the state's Ground Water Quality Rule [IDAPA §58.01.11], as well as with this BMP guidance. At the request of Kootenai County or the PHD, plan and specification review may be performed by DEQ, for any structure built to treat or dispose of non-domestic wastewater [Idaho Code § 39-118].

Fire District

The applicable fire district reviews critical materials storage for compliance with state and local fire codes.

Kootenai County

Building Department

The Kootenai County Building Department reviews and issues permits for all construction plans related to critical materials handling and storage including site grading, slab, and structural proposals. The Building Department classifies materials to be stored and handled on site in relation to fire codes and structural ratings. For building permits, this department solicits comments from all agencies that have jurisdictional authorities related to the site.

Planning and Zoning Department

The Kootenai County Planning and Zoning Department reviews the storage and location of critical materials for compliance with county planning and zoning ordinances. For projects requiring a Conditional Use Permit, affected agencies may be asked for input. Additional requirements, such as secondary containment, may be imposed as Conditions of Approval.

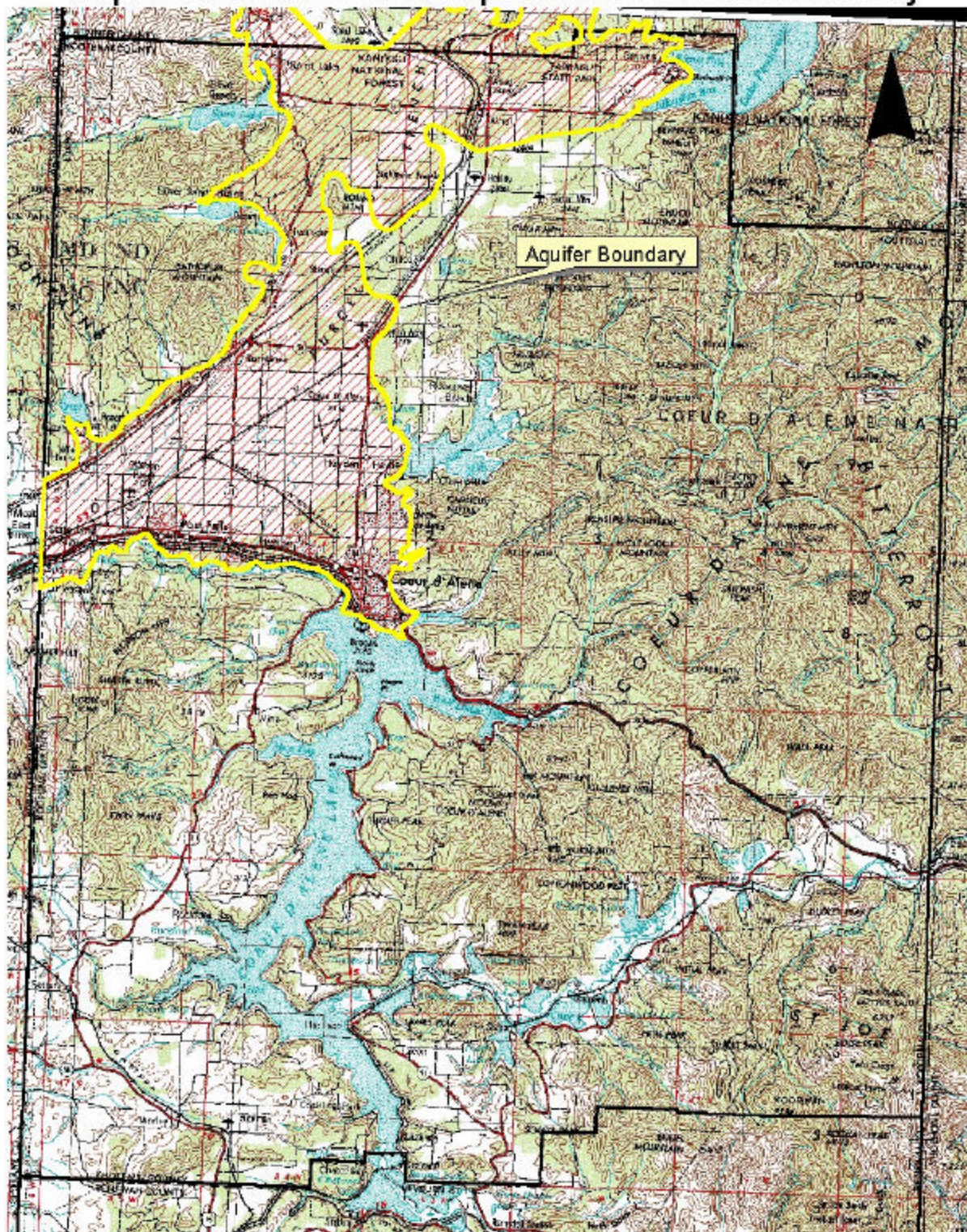
Panhandle Health District

The Panhandle Health District reviews all critical materials storage and handling **over** the Rathdrum-Prairie Aquifer. They are responsible for ensuring compliance with the Critical Materials regulations [IDAPA §58.41.01.400]. This includes:

- (1) Classifying critical materials in relation to hazard, for inclusion or exclusion from the Critical Materials regulation.
- (2) Processing an application and application fee.
- (3) Plan reviews.
- (4) Periodic inspections of regulated facilities.

Appendix B - Rathdrum-Prairie Aquifer Map

Map of Rathdrum Prairie Aquifer within Kootenai County



Appendix C - Concrete Coatings

Coatings for concrete secondary containment areas are recommended. The main function of the coating is to seal the concrete barrier, which, on its own, might be unable to prevent seepage of small to large amounts. Coatings also protect the concrete from chemical breakdown that can occur when liquids come into contact with the concrete.

While coatings can enhance the containment of liquids and prolong the life of the concrete, it is important that new concrete structures be designed with the proper mix/ingredients for the area and product being stored, have proper reinforcement, and have appropriate joint details. This will reduce the potential for cracking or joint separation and help ensure the integrity of the containment.

There is a vast variety of coating materials that are categorized in a number of ways. Some of the more common materials mentioned for coatings are liners (usually polymers), paints, resins, epoxies, acrylics, polyesters, polyurethanes, bitumens, and elastomers. Trade organizations that deal with the type of materials a facility handles should be able to direct the facility to coating vendors that can provide coatings that are satisfactory for the stored materials.

Selection Factors

Factors to consider when choosing a coating material should include:

- Ability to bond to the substrate.
- Durability (to impacts, heavy equipment used in the containment area, reaction to spilled materials, photo degeneration, etc.).
- Resistance to microbial action (stains, odors, scaling, etc.).
- Flexibility (ability to stretch and shrink instead of crack).
- Chemical compatibility with the product being stored.
- Projected life of the product.
- Cost.
- Ease of application.
- Reaction to expected weather conditions.

Application Factors

Factors to consider when applying coatings include:

- Safety of the applicators (slipping or presence of volatiles).
- Preparation of the substrate prior to coating application (must usually be very clean).

Appendix D - Daily Facility Inspection Checklist

Inspected by: _____

Date: _____

Time: _____

General Weather Conditions: _____

Primary Containment

Leakage visible?	Yes	No	NA
Corrosion/damage visible?	Yes	No	NA
Primary leak detection devices working properly?	Yes	No	NA
All valves and openings in primary containment secure?	Yes	No	NA

Piping Inspection

Any apparent leaks in piping?	Yes	No	NA
Any apparent damage to piping or support structure?	Yes	No	NA
Protective barriers in place?	Yes	No	NA

Secondary Containment

Valves/openings secure?	Yes	No	NA
Water or product in area?	Yes	No	NA
Damage to structure (cracks, holes, impacts, scratches or scars in coating, etc)	Yes	No	NA
Noticeable leaks or stains on outside perimeter?	Yes	No	NA
Interstitial leak detection functioning?	Yes	No	NA

Security

Fencing intact?	Yes	No	NA
Lighting systems functioning?	Yes	No	NA
Doors/gates/entryways secure?	Yes	No	NA

Comments:
